

Application No. 10/531,549  
Amendment dated April 7, 2009  
Reply to Office Action dated October 7, 2008

**REMARKS**

In the Office Action dated October 7, 2008, claims 1-4, 6-31 and 33-50 were examined with the result that all claims were rejected. The Examiner made the rejection non-final. In response, Applicant has amended claims 1, 7, 8, 16, 25, 26, 28 and 42, cancelled claims 10 and 48, and added new claims 51 and 52. In view of the above amendments and following remarks, reconsideration of this application is requested.

**The Rejections under 35 U.S.C. 112**

The Examiner has rejected claims 1, 3-4, 7-11, 25, 27-28, 30-31, 34-38 and 49-50 on the basis that the phrase “the source of fluxing oxides” creates ambiguity and is thus indefinite. In response, Applicant believes that the claims, as herein amended, clearly delimit the meaning of “fluxing oxide”.

A fluxing oxide is now referred to in claims 1 and 28 as:

“selected from the group consisting of metal oxides, phosphorus oxides and boron oxide”,

together with the existing limitation that the “fluxing oxides form a liquid phase in the composition at a temperature less than 1000°C” this clearly and unambiguously defines the range of oxides. A skilled person, having regard to the teaching in the specification and the well explored properties of these compounds, will have no difficulty in understanding what is required in selecting appropriate oxides, which form a liquid phase at the required temperature.

The broadest aspect of the invention is based on the finding that selecting amounts of fluxing oxide which form a liquid phase at 1000°C together with defined fillers can achieve good ceramic residue strength and dimensional stability following combustion of the organic polymer base. Further limitation would not provide adequate protection for the principle of constructions discussed in the specification and defined in the claims. The claims also refer to precursors of metal oxides which form fluxing oxides at temperatures of less than 1000°C. The decomposition of compounds such as metal, phosphorous and boron compounds to oxides at such temperatures is well understood and

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a skilled artisan will have no difficulty in understanding the range of compounds.

The Examiner also rejects claims 16 and 42 due to improper Markush language. The Markush language in claims 16 and 42 has been corrected. Claim 48 was rejected as being unclear under §112 and as being directed toward unpatentable subject matter under §101. In response, claim 48 has been cancelled rendering moot the objections to this claim.

§102(e) and/or §103(a) Rejections over Romenesko et al.

The Examiner rejects claims 1-4, 6-31, 33-47 and 49-50 under 35 U.S.C. 102 (e) as anticipated by or in the alternative under 35 U.S.C. 103 (a) as obvious over Romenesko et al. US6433049 (Romenesko). The invention described by Romenesko is summarised in column 3, lines 60 to 66 as follows:

"We have discovered that a composition comprising a polyolefin, a polyorganosiloxane having at least two alkenyl groups per molecule, and calcium silicate, where the polyorganosiloxane is cured after mixing using an organohydrido silicon compound and a hydrosilation catalyst to create a thermoplastic vulcanizate, provides excellent fire resistance." (*underlining added*)

Romenesko et al. teach that the improvement in fire resistance is dependent on the use of specific unsaturated polyorganosiloxanes, together with a hydrosilation catalyst to create a thermoplastic vulcanisate after mixing of the polyolefin, unsaturated polyorganosiloxane, organohydrido silicon, hydrosilation catalyst, optional reinforcing filler and calcium silicate (such as Wollastonite).

The prior art Romenesko et al patent does not teach the use of fluxing oxide.

Wollastonite, a silicate mineral used by Romenesko et al does not contain fluxing oxide. The calcium silicate present in Wollastonite has a melting point well in excess of 1000°C. Although some silicate minerals, such as micas, may contain fluxing oxides in

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their crystal structure, calcium silicates and in particular Wollastonite, do not generally contain fluxing oxides.

Applicant encloses extracts from Wikipedia relating to mica and Wollastonite which show the difference in structure and mineral content of these materials.

In contrast to Romenesko et al, which relies on cross linking with a hydrosilation catalyst after forming the blend, the present invention relies on the use of a defined amount of fluxing oxide to provide binding between particles of mineral silicate present in the ceramic residue which remains after a fire.

The Examiner suggests that Romenesko et al discloses glasses. While Romenesko et al refers to the glass transition temperature of a polymer, they do not teach glasses containing a source of fluxing oxide. The Examiner asserts that Romenesko et al teaches silica, hydroxides and carbonates. In fact, Romenesko et al refers to calcium carbonate, magnesium hydroxide and silica. Each of these compounds do not form a liquid phase until well over 1000°C and hence, can not in any relevant sense, be regarded as fluxing oxides or sources of fluxing oxides. Magnesium oxide has a melting point of 2852°C, calcium oxide has a melting point of 2614°C and silicon oxide has a melting point of over 1600°C.

The present invention uses the defined fluxing oxide in an amount of from 1 to 15% by weight of the residue present after exposure of the composition to temperatures experienced under fire conditions.

The use of the select amount of fluxing oxide in accordance with the invention is important for reasons explained in detail in the specification at paragraph [0027] and [0028]. If the amount of fluxing oxide is greater than 15% the ceramic left on exposure to a fire undergoes a significant change in dimensions. This may be due to the composition fusing in the presence of a significant proportion of liquid flux.

The compositions of the present invention minimise the change in dimensions when the composition is combusted to leave a ceramic residue. The change in dimensions has a dramatic effect on the fire barrier properties of a composition. It exposes gaps for the passage of fire and severely compromises the insulation of important systems required

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for fire fighting or evacuation such as power cables, communication systems, or the like.

At levels of less than 1% the strength of the ceramic are lost due to the presence of insufficient fluxing oxide to improve strength. This can result in the composition rapidly disintegrating when the inorganic components are lost due to combustion.

The Romenesko et al composition does not include a fluxing oxide or any material which would inevitably provide a fluxing oxide and accordingly, does not teach, or in any way suggest, the present invention. Further, anyone seeking to improve the fire resistance and strength of a ceramic residue formed on combustion of a polymer blend, would be lead by Romenesko et al to use a hydrosilation catalyst, rather than the measured amounts of fluxing oxide called for by the present invention. Romanesko et al thus teaches away from the present invention.

In order to examine the relative effect of the fluxing oxide on the comparison composition used by Romenesko et al, one of the present inventors has conducted side by side experimental work to examine the effect of the addition of fluxing oxide to the Romenesko et al comparative composition (without hydrosilation catalyst). It is appropriate to omit the silation catalyst, as this is the base composition which Romenesko et al seeks to improve and the present invention does not require such a catalyst.

Results of the experimental work are provided in the Declaration of Dr Don Rodrigo attached hereto.

The compositions prepared are as follows:

	Romenesko Base		Current Invention	
	(g)	(%)	(g)	(%)
Polyolefin (HDPE or LLDPE )	60.0	30.0	60.0	30.0
Silicone with crosslinker	46.8	23.4	46.8	23.4
Wollastonite	93.2	46.6	78.2	39.1
Glass#3			15.0	7.5
Residue		58.5		58.5

The glass #3 composition was as follows:

	Mpt
33.5% SiO <sub>2</sub>	Over 1600°C
18.2% Na <sub>2</sub> O	~930 °C (d)
10.8% K <sub>2</sub> O	<765 °C (d)
19.3% TiO <sub>2</sub>	Over 1640 °C
1.8% P <sub>2</sub> O <sub>5</sub>	~570 °C
8.7% V <sub>2</sub> O <sub>5</sub>	~690 °C
7.7% Other	Not known

Note: Some of the fluxing oxides decompose instead of melting at atmospheric pressure – (d) is shown in front of melting point to indicate that. Therefore the melting points given here are approximate. However it must be noted that those fluxing oxides react with the silicate mineral present to form a liquid phase (or flux). That is how many fluxing oxides lead to the formation of liquid phase, particularly K<sub>2</sub>O and Na<sub>2</sub>O.

The fluxing oxide content is thus 39.5% of the glass composition which in the residue represents 5.1% by weight of the residue remaining after exposure to an elevated temperature experienced under fire conditions.

In the presence of the glass the content of Wollastonite was decreased slightly to maintain the same total inorganic residue, so that the compositions can be directly compared.

As shown in the results provided in the Rodrigo Declaration, the presence of fluxing oxide (5.1%) based on residue leads to a more than twenty times increase in strength of the residue.

This represents a profound improvement in the fire barrier properties.

The Romenesko et al invention requires addition of hydrosilation catalyst to the

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composition involving significant processing after formation of the composition. These processes may reduce the efficiency of processing particularly in extrusion processes used in cable manufacture. The present invention provides a remarkable improvement in strength without the need for this step and this provides an alternative to Romenesko et al or a method which could be used in addition to the systems of Romanesco et al.

Clearly the invention is patentably distinguished from Romenesko et al.

IDS

Applicant wishes to draw the Examiner's attention to the client's co-pending patents and applications and lodge an IDS relating to the art cited. Enclosed is a list of the co-pending applications and the documents cited along with copies of the foreign documents and translations as required by the Rules.

An effort has been made to place this application in condition for allowance and such action is earnestly requested.

Respectfully submitted,  
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